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Intensity of Internet Use in Canada: Understanding Different Types of Users

by Catherine Middleton (Ryerson University), Ben Veenhof (Statistics Canada) and Jordan Leith (Ryerson and York Universities)

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Symbols

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.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
p	preliminary
r	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
E	use with caution
F	too unreliable to be published

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Abstract

This paper investigates the intensity and scope of Internet usage among individual Canadians, based on data from the 2005 and 2007 Canadian Internet Use Surveys (CIUS). It profiles various aspects of online behaviour and analyzes the 2007 findings to examine patterns of scope of Internet use by user characteristics. Multivariate analyses are applied to explore the relationships among Internet use behaviour and characteristics such as age, sex, income, and education.

In addition to the shift from dial-up to high-speed Internet access that has been occurring among Canadian Internet users, the 2005 to 2007 period also saw a slight increase in the proportion of users who were online daily and for at least five hours per week. While this proportion is growing, fewer than 50% of Canadian Internet users were characterized as high intensity users in 2005 and 2007. Among individuals with high-speed connections, the low intensity users continued to outnumber the high intensity ones, challenging the notion that access to a high speed connection leads to intensive Internet usage. Among Internet users, age, income, sex, and years of online experience were all associated with the propensity to engage in online activities and to use the Internet intensively. The finding that experienced Internet users do use the Internet in more extensive ways underscores the importance of studying the nature of Internet users as they gain more experience.

Intensity of Internet Use in Canada: Understanding Different Types of Users

by Catherine Middleton (Ryerson University), Ben Veenhof (Statistics Canada) and Jordan Leith (Ryerson and York Universities)

1 Introduction and context for the study

This paper continues to explore how Canadians are using the Internet following work conducted by Middleton and Ellison (2008). It investigates the intensity and scope of Internet usage among individual Canadians, based on data from the 2005 and 2007 Canadian Internet Use Surveys (CIUS). As first reported by Statistics Canada in 2008 (Statistics Canada 2008a, 2008b), Internet use is fairly prevalent, with increased numbers of Canadians now connecting to the Internet using a high speed connection.

As information and communications technologies (ICTs) become more pervasive, it can be argued that basic computer and Internet skills are important for economic success (Atkinson and Castro 2008). Digital literacy is essential for communication and education and to access government and health information online. The Canadian data show that many Canadians are using the Internet for these purposes, suggesting that a basic level of digital literacy is present in the Canadian population.

It has been stated that broadband technologies provide a foundation for sustaining an information economy (Dutta and Mia 2009; UNCTAD Secretariat 2007), and a broadband connection is considered "a prerequisite for sharing in the economic and social benefits of a broad array of new ICT services and applications in the private and public sectors" (Telecommunications Policy Review Panel 2006, p. 8-4). Governments have also identified broadband technologies as important channels for delivering services to their citizens.

For example, Australia recently launched the *National Broadband Network* initiative, designed to bring broadband connectivity to 90% of the Australian population over an eight-year period. The Korean *Next Generation Network* program plans to bring broadband to 14 million premises by 2012, and in the United States, the *American Recovery and Reinvestment Act of 2009 (ARRA)* included provisions to accelerate broadband deployment in unserved and underserved areas (Neogi et al., 2009). Canadian initiatives, such as the *Broadband Canada: Connecting Rural Canadians* program are also attempting to expand broadband availability, particularly in rural areas (Industry Canada 2009).

Canadians were early adopters of broadband technologies, with high speed access available in urban areas as early as 1996 (Lie 2003). According to the Canadian Radio-television and Telecommunications Commission (CRTC), 94% of Canadian households now have access to wired broadband connections, with 69% of households actually subscribing to a high speed service[1] (CRTC 2009). The 2007 CIUS data indicate that 88% of Canadian individuals who used the Internet at home had a high speed connection (Statistics Canada 2008a). Canada was ranked 8th in terms of household broadband adoption among OECD countries (OECD 2009).

These statistics demonstrate Canadians' generally high level of 'readiness' for participation in the information economy. However, the statistics and rankings are based on basic indicators such as Internet and broadband

1. The CRTC differentiates between *high speed* and *broadband* Internet connections. High speed connections are defined as those at or above speeds of 128 Kbps. Broadband connections are those at or above speeds of 1.5 Mbps. In 2008, 52% of Canadian households had a broadband connection, according to CRTC data. These subscriber statistics are based on residential data gathered from suppliers offering Internet services. The CIUS measures individuals and uses the term "high speed". On the 2005 and 2007 CIUS, individuals were classified as having high speed access if they had a cable or satellite connection at home, or another type of connection (telephone, television, wireless, or other) that they identified as being a high speed connection. For these reasons, the two sources should not be directly compared.

adoption rates. While providing a useful means for international comparisons, this approach does not offer much insight into actual adoption patterns or the real nature of ICT usage within a country. As has been demonstrated using earlier Statistics Canada datasets on Internet adoption (see for example Middleton and Ellison 2008), simply having a high speed connection, or being an Internet user, does not imply that such a connection is heavily used, or used for a wide variety of activities.

This paper is part of an ongoing effort to develop a better understanding of Internet use patterns in Canadian society. It supplements and extends previous work in this area (Lecavalier and Veenhof 2008; McKeown and Brocca 2009; McKeown, Noce and Czerny 2007; Middleton and Ellison 2008; Middleton and Leith 2007, 2008; Underhill and Ladds 2007; Veenhof 2006). The first section profiles various aspects of online behaviour with a comparison of 2007 to 2005. The focus then shifts to the 2007 findings to examine patterns of scope of use by user characteristics. In the final section, multivariate analyses are applied to explore the relationships among Internet use behaviour and socio-demographic characteristics such as age, sex, income, and education.

2 Internet use in Canada: 2005 and 2007 data

Box 1

Comparing data: 2005 and 2007 Canadian Internet Use Surveys

The CIUS is not a longitudinal survey, but was designed to allow for comparisons of cross-sectional data collected in different years. This study explores Canadians' Internet use patterns based on data collected in the 2005 and 2007 surveys, focusing on Canadians who used the Internet from home for personal use in the twelve months prior to each survey. The 2005 survey included Canadians aged 18 and older; the 2007 survey included Canadians aged 16 and older. To ensure that the two data sets analyzed here include users of the same age, results exclude the 16 and 17 year old respondents in the 2007 survey.[2]

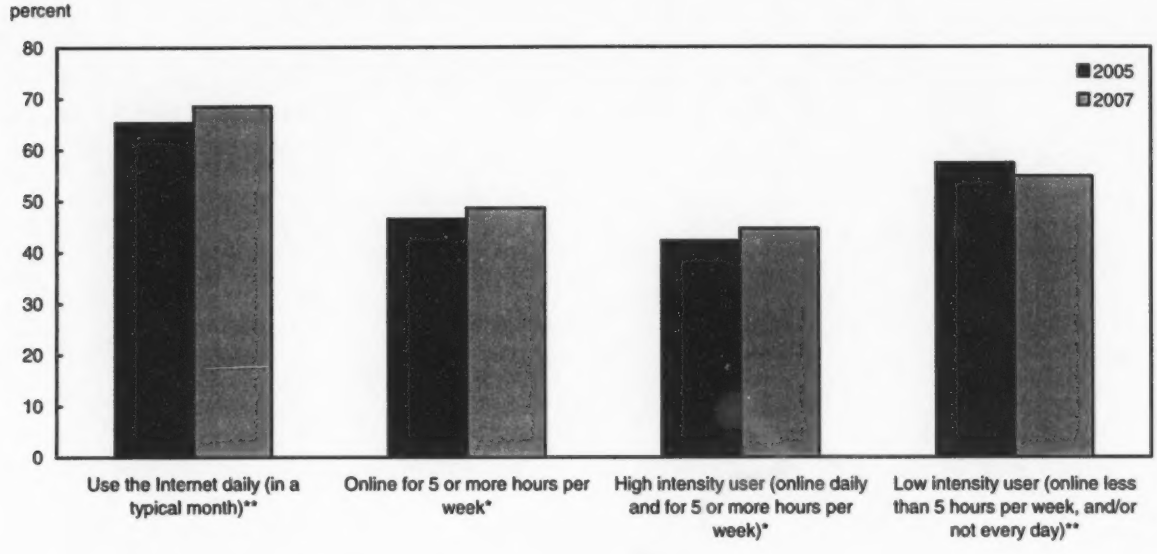
2.1 Intensity of use: Frequency of use and hours online

A starting point for understanding how Canadians incorporate the Internet into their daily lives is frequency of use. In 2007, slightly more than two-thirds of home Internet users went online at least once a day, representing a small change in frequency of use compared to 2005. Respondents were also asked how much time they spent online, with less than half of Canadian Internet users reporting that they spent five or more hours on the Internet in a typical week (Chart 1).

Measures of frequency of use and time spent online provide some insight into how Canadians use the Internet, but these basic measures do not allow for an examination of different usage patterns. For instance, do daily users stay online for long periods of time? Do some users go online frequently but for short periods of time only? A measure of intensity of use addresses these questions. Intensity data are described in Box 2, and the proportions of high and low intensity users for 2005 and 2007 are presented in Chart 1.

2. Given the exclusion of the 16 and 17 year old respondents from the 2007 data, results presented here differ from those previously released for the CIUS (e.g. Statistics Canada 2008a).

Chart 1
Intensity of Internet use, home Internet users[1] aged 18 and older, Canada, 2005 and 2007



* Difference between 2005 and 2007 is statistically significant at the 95% confidence level ($p < 0.05$)
** Difference between 2005 and 2007 is statistically significant at the 99% confidence level ($p < 0.01$)
1. Includes individuals who used the Internet from home in the 12 months preceding the survey and who had a home Internet connection at the time of the survey.
Source(s): Statistics Canada, Canadian Internet Use Survey, 2005 and 2007.

Box 2

Measuring intensity of Internet use

Intensity of Internet usage is calculated by combining frequency of Internet use with hours spent online. This provides a more nuanced measure of how individuals use the Internet, differentiating among those who are both high frequency and high duration users, and those who are less intense users, either going online less frequently, and/or spending less time online.

For the purposes of this study, a *high intensity user* is defined as one who is online for 5 or more hours per week from home, and uses the Internet daily. Conversely, a *low intensity user* is defined as a home Internet user who either does not use the Internet daily or is online for less than 5 hours per week.

The combination of speed and intensity data produces four user types (see Chart 2).

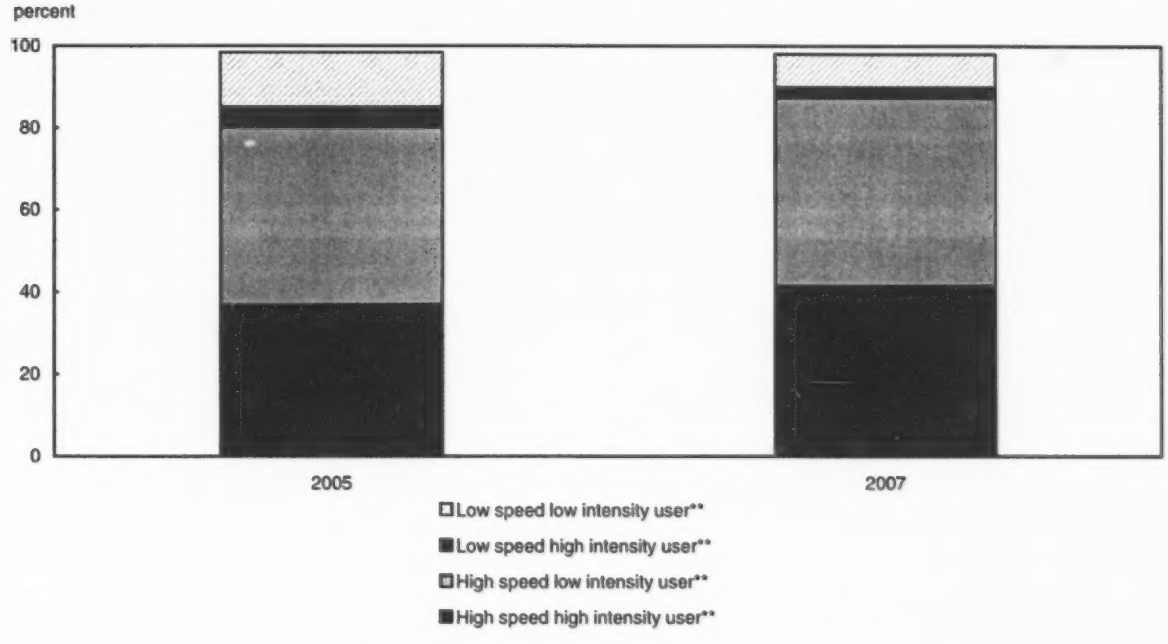
Of note here is the fact that fewer than 50% of Canadian Internet users were characterized as high intensity users in 2005 and 2007. Some would argue that the threshold for categorization as a high intensity user is quite low, but the data show that the majority of Canadian Internet users did not choose to use the Internet daily and for more than five hours per week from home. Additionally, it is noted that although there is movement away from low intensity usage patterns toward the high intensity pattern, the proportion of high intensity users increased by just over two percentage points in the two-year period from 2005 to 2007. Given that approximately 70% of Canadians were Internet users in 2007, this means that fewer than one-third of all adult Canadians were online daily and spent more than five hours online in a typical week. Based on the classification developed for this study, the majority of Canadians would not be categorized as high intensity Internet users in 2007.

2.2 Connection speed and intensity of use

As noted earlier, access to a high speed connection is considered an important amenity in an information society. In 2007, about 88% of Canadian home Internet users accessed the Internet with a high speed connection, up from 80% in 2005 (CIUS). As such, most Canadian Internet users should now have the technical capacity to take advantage of the benefits that the Internet can offer. But as previous analysis of the Household Internet Use Survey (HIUS) data demonstrated (Middleton and Ellison 2008), simply having access to a high speed Internet connection does not mean that a household demonstrates high engagement with the Internet, as measured by intensity or scope of Internet usage. Consistent with this observation, the data above reveal that many Canadians are not high intensity Internet users, regardless of the speed of their Internet connections.

The specific relationship between the speed of users' Internet connections and their intensity of use is shown in Chart 2. High speed connections are provided by DSL, cable modem or satellite, and low speed connections use dial-up access.[3]

Chart 2
Intensity and speed of Internet use by individuals, percentage of home Internet users[1], Canada, 2005 and 2007



** Difference between 2005 and 2007 is statistically significant at the 99% confidence level ($p < 0.01$)
1. Includes individuals who used the Internet from home in the 12 months preceding the survey and who had a home Internet connection at the time of the survey.
Source(s): Statistics Canada, Canadian Internet Use Survey, 2005 and 2007.

The results in Chart 2 reflect a continuation of the movement from dial-up access to high speed that has been occurring over the past few years. These figures also reveal that a shift to high speed does not necessarily result in more intense usage. Indeed, since 2001, among both Canadian households and individuals with high speed connections, the low intensity users have always outnumbered the high intensity ones.[4] While the proportion of high speed high intensity users increased from 2005 to 2007, so too did the proportion of high speed low intensity users. It

3. The high speed variable is derived from self-reported questions on type and speed of connection. Only those respondents who used the Internet from home and were connected at the time of the survey were asked about their connection.
4. See Middleton and Ellison (2008) for a detailed discussion of speed and intensity of usage among Canadian households using data from the 2001 to 2003 Household Internet Use Surveys.

is not surprising to find fewer high intensity users among those with low speed connections, as the inconvenience of dialing up to the Internet, and the lack of speed once connected may make it less appealing to go online frequently or for extended time periods. However, these data continue to challenge the notion that access to a high speed connection leads to intensive Internet usage.

2.3 Scope of usage and online engagement

The discussion above centres on the duration and frequency of Internet use, but does not provide any insights as to what users do while they are online. Another important consideration in understanding the extent to which Canadians are making use of the Internet relates to the types and range of activities in which users engage. What is the scope of Internet usage, and how does it differ among Canadian Internet users? Box 3 describes some specific uses of the Internet and explains how these uses were analyzed across the 2005 and 2007 CIUS data sets.

Box 3

Specific uses of the Internet: Comparison and categorization

Both the 2005 and 2007 surveys collected data on the specific activities individuals did online, from home, in the past twelve months. The 2007 survey included more activities than in 2005 (for example, asking about activities like making telephone calls online or using the Internet to search for employment), and data on some activities were collected in slightly different ways in 2007 than in 2005.[5] A subset of the 20 activities common to both the 2005 and 2007 surveys was collapsed into five categories for the purposes of analysis:

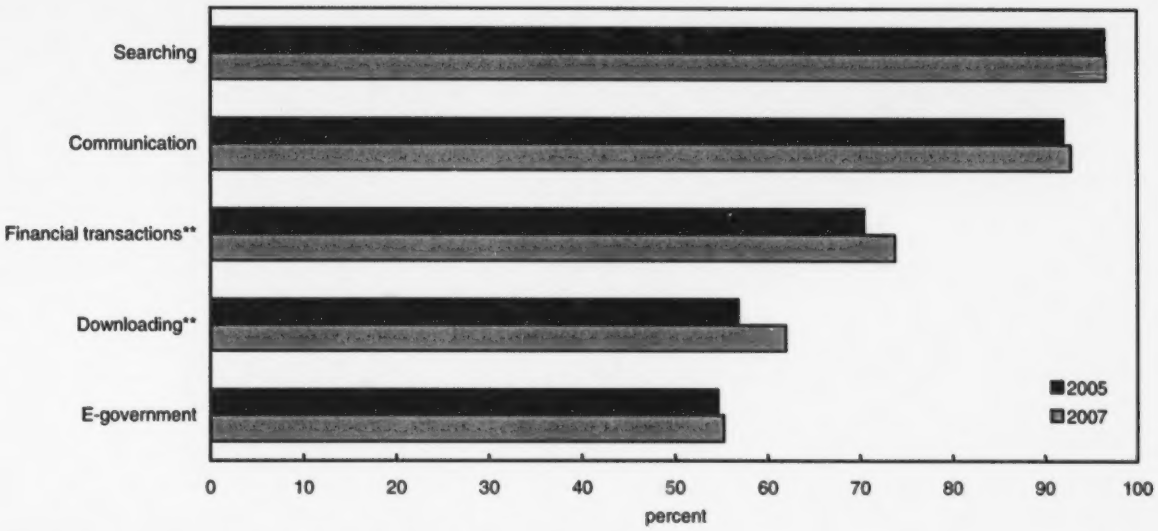
Searching:	Using the Internet for general browsing, or searching for weather/road conditions, travel, news or sports, medical/health information, community events, researching investments
Communication:	Using the Internet for email, instant messenger/chat
Financial Transactions:	Using the Internet for electronic banking, ordering goods and services online
Downloading:	Using the Internet to obtain music, software, TV, or movies, or to listen to the radio
E-Government:	Using the Internet to search for government information, or to communicate with government.

Box 4 provides a complete list of the activities included in the 2007 survey.

Chart 3 provides an overview of online activities, comparing 2005 data with 2007 data. Users are counted in a particular category if they reported doing at least one of the listed activities. With 97% of users conducting online searches and 93% using the Internet for communication in 2007, uptake is approaching a maximum, with almost all Internet users now engaging in these activities. Almost three-quarters of Canadian Internet users conducted financial transactions online in 2007, up from 70% in 2005. The area that has shown the largest increase in use since 2005 is online downloading, with over 6 in 10 Canadians (62%) using the Internet in 2007 as a source of entertainment, and/or as a means to obtain or update software. This is up from 57% in 2005. The proportion of users accessing government services or communicating with governments showed no significant change from 2005 to 2007.

5. For instance, in 2005 users were asked separate questions about online banking and paying bills online. In 2007, they were asked a single question about electronic banking.

Chart 3
Uses of the Internet from home, home Internet users[1] aged 18 and older, Canada, 2005 and 2007



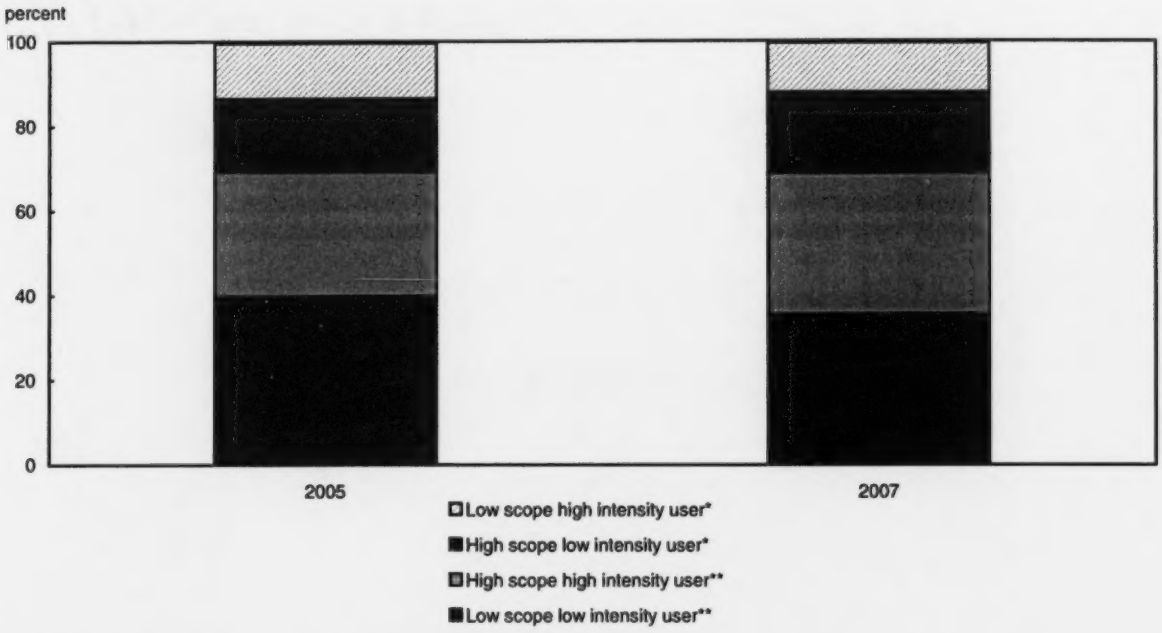
** Difference between 2005 and 2007 is statistically significant at the 99% confidence level ($p < 0.01$)
1. Includes individuals who used the Internet from home in the 12 months preceding the survey.
Source(s): Statistics Canada, Canadian Internet Use Survey, 2005 and 2007.

To conduct further exploration of Internet usage, a measure of engagement was created, combining scope of use with intensity of use. Scope, or breadth of use, measures the range of activities done by individuals online. Here, the scope measure is based on the 20 activities common to both the 2005 and 2007 surveys (see also Box 4). From this list, the mean number of online activities reported was between 9 and 10 activities for both years.[6] High scope users were defined as individuals above the mean, thus including persons who reported 10 or more activities. The proportion of home Internet users who were high scope users rose from just under one-half (47%) in 2005 to just over one-half (52%) in 2007.[7]

By combining scope of use with intensity of use it is possible to further identify different types of users. These are illustrated in Chart 4, and reflect the overall increases in both scope and intensity of use in 2007 compared with 2005. Specifically, the data show a decrease in the number of low scope, low intensity users (those who don't go online particularly regularly or for long time periods, and who don't do many activities when they are online), concurrent with an increase in high scope, high intensity users (those who are online daily, for extensive periods of time, and carry out a broad set of activities). Each of these two groups comprises about one-third of Canadian Internet users, indicating that there are as many Canadians who have low engagement with the Internet as there are those who are heavily engaged. The high scope, low intensity users, who made up close to one-fifth of users in 2007, do a broad range of activities online, but do not do such activities frequently or for extensive time periods. There is also a group of users who appear to be specialists in their Internet usage: they do not engage in a broad range of activities, but exhibit high intensity of usage. In 2007, just over one-tenth of home Internet users fell in to this group of low scope, high intensity users.

6. Note that this mean reflects the 20 comparable items only, not the complete list of specific uses reported in each survey.
7. The increase in the proportion of high scope users from 2005 to 2007 was statistically significant, at a 99% level of confidence ($p < 0.01$).

Chart 4
Online engagement: Scope and intensity of use, percentage of home Internet users[1], aged 18 and older, Canada, 2005 and 2007



* Difference between 2005 and 2007 is statistically significant at the 95% confidence level ($p < 0.05$)
** Difference between 2005 and 2007 is statistically significant at the 99% confidence level ($p < 0.01$)
1 Includes individuals who used the Internet from home in the 12 months preceding the survey and who had a home Internet connection at the time of the survey.
Source(s): Statistics Canada, Canadian Internet Use Survey, 2005 and 2007.

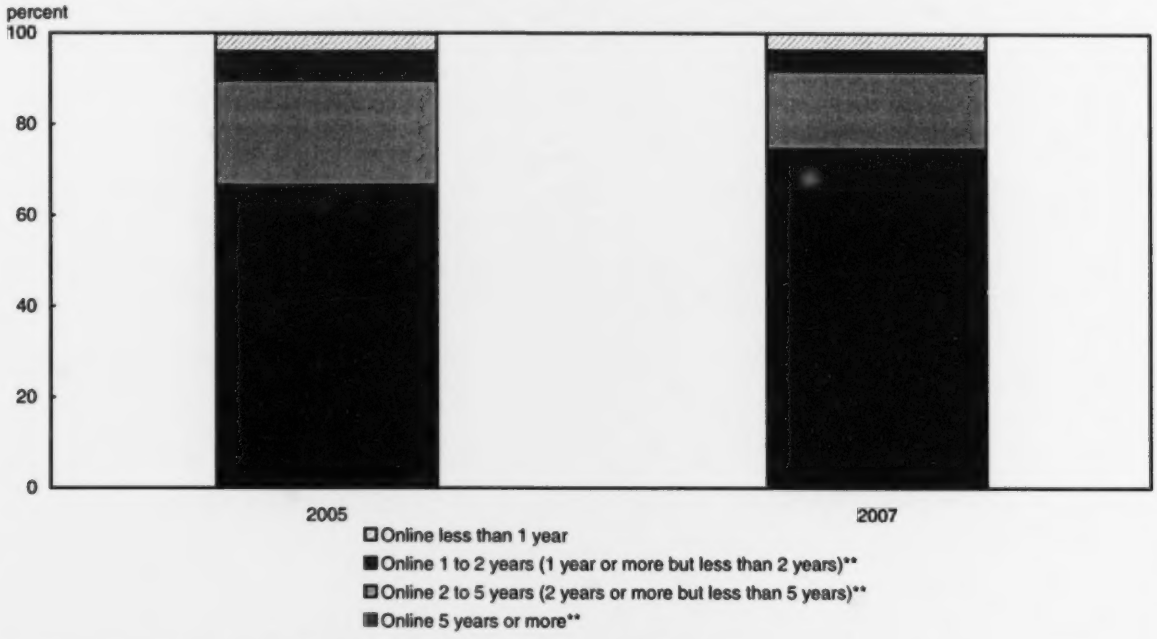
While each type of activity measured on the survey was more popular among high intensity users in 2007, there were some variations in the types of activities that high and low intensity users preferred. For example, while obtaining travel information or making travel arrangements ranked as the seventh most popular activity among high intensity users in 2007, it was the third most popular activity (behind email and general browsing) for low intensity users[8]. On the other hand, activities such as instant messaging and downloading software ranked as more popular activities among high intensity users than low intensity users.

2.4 Experience: Years online

At this point, it is useful to consider users' online experience, as measured by the number of years online. As Chart 5 depicts, most Canadian Internet users have been online for 5 or more years. This is not surprising, given that Canadians were early Internet adopters, and that high speed connections were available as early as 1996 (11 years prior to the 2007 survey).

8. While travel information was the third most popular activity among low intensity users, the proportion of low intensity users (61%) engaging in this activity in 2007 was still lower than that of high intensity users (76%). In fact, participation rates were higher among high intensity users for all activities measured.

Chart 5
Years of Internet use, percentage of home Internet users[1] aged 18 and older, Canada, 2005 and 2007



** Difference between 2005 and 2007 is statistically significant at the 99% confidence level ($p < 0.01$)
1. Includes individuals who used the Internet from home in the 12 months preceding the survey.
Source(s): Statistics Canada, Canadian Internet Use Survey, 2005 and 2007.

With almost 75% of Canadian Internet users online for five or more years by 2007, the data presented in this section are largely representative of a group of experienced users. This may offer a reason for the small differences in usage patterns between 2005 and 2007 — experienced users are likely to have established patterns of use which may not easily be changed. This point is explored further below.

2.5 Experience: Scope and intensity of use

Chart 6 illustrates the five categories of activities described earlier in Box 3, showing the differences between experienced users (online for 5 or more years), and those who are new to the Internet (online for less than a year). The 2005 and 2007 data are grouped together, so that when looking at the data for each activity, the first two bars on the chart indicate experienced users, and the second two indicate the Internet novices.

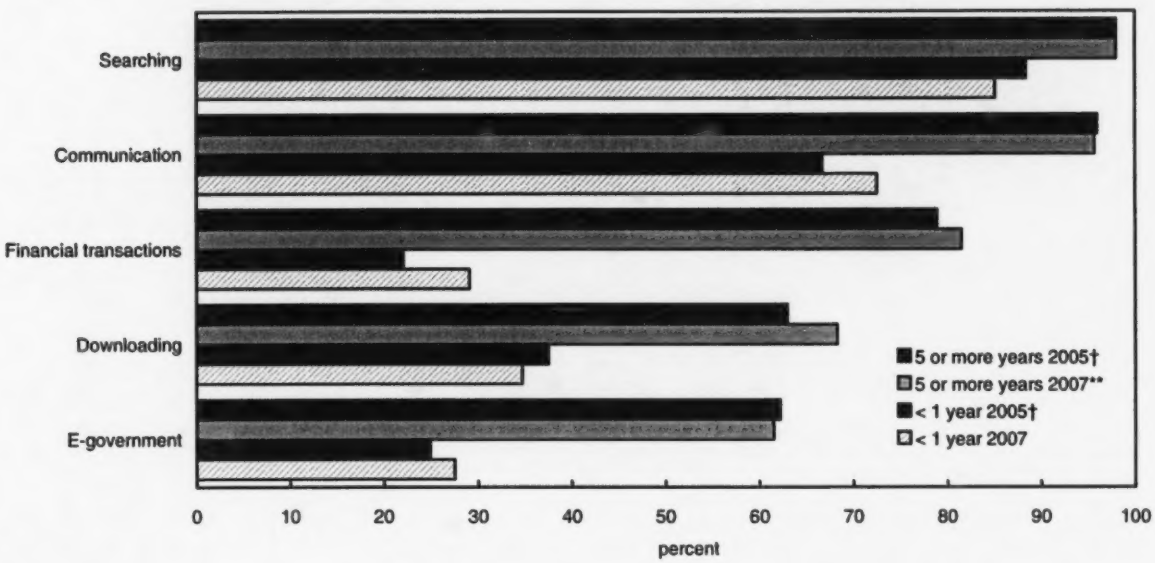
As expected, the experienced users are also those most likely to do any of the types of activities shown in the figure. Of particular interest is the fact that new users were much less likely to use the Internet for communication (sending email, using an instant messenger or chatting) than the average user: 96% of experienced users engage in communication activities, compared to just 73% of new users. Communication is often thought to be one of the primary reasons for using the Internet, but it appears that it takes time for new users to take up this activity. New users were most likely to use the Internet for searching, with 85% doing this in 2007 (compared with 98% of experienced Internet users). Among experienced users, financial transactions and downloading were the only activity categories that experienced a significant increase from 2005 to 2007.

A recent study of factors related to the propensity of individuals to purchase online also found years of Internet experience important for financial transactions (McKeown and Brocca 2009). Previous research has reported that

with online experience, users achieve a level of Internet self-efficacy, or belief in their ability to accomplish certain tasks online (Eastin and LaRose 2000, Underhill and Ladds 2007).

In addition to showing differences among users based on their years of Internet use, the results in Chart 6 and Table 1 also provide some insights into what could be described as anticipated maximum scope and intensity of use patterns. It is observed that those who have been online for 5 or more years demonstrate the highest scope and highest intensity of use. But when looking at experienced users, there has been relatively little increase in high scope and high intensity use between 2005 and 2007.[9]

Chart 6
Online activities by years of Internet experience, home Internet users[1] aged 18 and older, Canada, 2005 and 2007



† Reference group
** Difference from reference group is statistically significant at the 99% confidence level ($p < 0.01$), for financial transactions and downloading only
1. Includes individuals who used the Internet from home in the 12 months preceding the survey.
Source(s): Statistics Canada, Canadian Internet Use Survey, 2005 and 2007.

As noted earlier, some activity categories are likely approaching the maximum adoption rates, for instance the 93% usage for communication and the 97% usage for searching among all users. But what does it mean that just over 60% of experienced users are using the Internet for access to, and communication with, governments? What are the impacts, if any, of having an experienced group of Internet users in which more than 30% are not using the Internet for downloading? While downloading music, television and watching movies can be considered 'non-essential' activities, is there a reason why over two-thirds of users do not download software? These are questions that would require additional data and research. Likewise, to understand why more experienced users are not using the Internet for e-government activities, it is important to understand what sorts of activities are possible, and whether these meet the needs of users. The data presented here suggest that there is a need for additional research on individuals' motivation to engage in specific Internet activities.

With respect to intensity of use, Table 1 reveals that even the most experienced users do not all spend large amounts of time online, with approximately 55% spending more than 5 hours online per week in 2007. About one-half (51%) of experienced users demonstrated high intensity usage, with 49% in the high speed, high intensity category. Overall,

9. One-half (50%) of users with five or more years of online experience were high intensity users in 2005, compared with 51% of such users in 2007. The proportion of experienced users who demonstrated high scope of usage increased marginally from 57% in 2005 to 61% in 2007. Only the latter change was statistically significant.

these numbers show that while Canadians do use the Internet, even among experienced users with high speed connections there are still many individuals who are not high intensity users. The implications of this finding cannot be determined from the survey data, but it is a point worth considering when assumptions are made about readiness for, or propensity to engage in, an information society.

Table 1
Intensity and scope of use by online experience, home Internet users[1] aged 18 and older, Canada, 2005 and 2007

User characteristic	5 or more years experience		All users	
	2005†	2007	2005†	2007
Online daily	72.7	75.3 *	65.3	68.5 **
Online for 5 or more hours per week	53.9	55.1	46.5	48.6 *
High intensity	49.9	51.4	42.2	44.6 *
High speed	83.1	89.5 **	80.1	87.6 **
High speed high intensity	44.7	48.5 **	37.0	41.6 **
High speed low intensity	38.3	40.8 *	43.0	45.7 **
High scope	57.0	61.2 **	46.6	52.2 **
High scope high intensity	37.2	39.9 *	29.2	33.0 **

† Reference group
* Difference from reference group is statistically significant at the 95% confidence level ($p < 0.05$)
** Difference from reference group is statistically significant at the 99% confidence level ($p < 0.01$)
1. Includes individuals who used the Internet from home in the 12 months preceding the survey and who had a home Internet connection at the time of the survey.
Source(s): Statistics Canada, Canadian Internet Use Survey, 2005 and 2007.

In the sections above, various measures of Internet usage are applied to reveal basic characteristics of Canadians' Internet usage patterns. On many dimensions, the results show that Canadians' levels of engagement with the Internet have not increased markedly from 2005 to 2007.

To extend the analysis further, the next section applies multivariate analyses to explore the effects of socio-demographic characteristics, such as age, sex, household income, and education levels, on Internet use patterns.

3 Scope patterns in 2007 by user characteristics

As already discussed, the number of different online activities individuals perform can serve as one indicator of users' level of engagement with the Internet. This section builds on the scope of use analysis, this time including activities measured for the first time on the 2007 CIUS. The activity measures were based on whether or not individuals had performed that activity in the 12 months prior to the survey (see Box 4).

Box 4

Measuring scope of Internet use on the 2007 CIUS

Scope of Internet use was studied by examining the total number of activities reported by users, as measured by the 2007 CIUS. A total of 26 activities were included in the index, and are listed below. The 2007 survey included some new activities not measured on the 2005 survey. This part of the analysis focuses on the wider range of variables available on the 2007 survey.

The 26 activities that comprise the 2007 scope measure used in this section are listed below:

- email
- instant messaging
- searching for government information
- communicating with government
- searching for medical or health information
- education, training or school work
- travel information or making travel arrangements
- searching for employment
- electronic banking
- researching investments
- playing games
- obtaining or saving music
- obtaining or saving software
- viewing news or sports
- obtaining weather reports or road conditions
- listening to Internet radio
- downloading or watching television programs
- downloading or watching movies
- researching community events
- researching other specific matters
- general browsing for fun or leisure (surfing)
- contributing content or participating in discussion groups (blogging, message boards, posting images)
- making online telephone calls
- selling goods or services (through auction sites)
- ordering goods or services
- window shopping for goods or services

In 2007, home Internet users reported having done just over 11 of the listed activities, on average (Table 2). However, the number of activities performed varied with a number of users' characteristics. This included users' socio-demographic characteristics as well as their level of online experience and type of connection.

Table 2
Mean number of online activities by age, online experience and connection type, home Internet users[1] aged 18 and older, 2007

	number
All users	**11.5**
Age group	
18 to 24	13.7 **
25 to 34	13.1 **
35 to 44†	11.7
45 to 54	10.5 **
55 to 64	9.4 **
65 and older	7.6 **
Years Internet experience	
< 1 year†	6.2
1 year to < 2 years	7.4 **
2 years to < 5 years	8.8 **
5 years or more	12.6 **
Connection type	
Low speed†	8.8
High speed	11.9 **

† Reference group
** Difference from reference group is statistically significant at the 99% confidence level ($p < 0.01$)
1. Includes individuals who used the Internet from home in the 12 months preceding the survey and who had a home Internet connection at the time of the survey.
Source(s): Statistics Canada, Canadian Internet Use Survey, 2007.

Age was strongly associated with scope of Internet use. The two youngest age groups examined (aged 18 to 24, and 25 to 34 years) reported the highest number of online activities — just over 13 activities for each group (Table 2). Beyond these two groups, scope of use declined with age. Scope also varied with other socio-demographic characteristics. For example, scope of use tended to increase with users' level of education and household income, and was also higher among persons in the labour force (data not shown).[10]

Distinct variations in scope of use are also evident for characteristics other than users' socio-demographic background, namely: their level of experience with the Internet and type of home Internet connection. Scope of use rises steadily with online experience — users who had been online for 5 years or more reported an average of 12.6 activities, significantly more than any other group with less experience. And users with high-speed connections at home averaged nearly 12 separate activities, about three more activities than those using low-speed connections. High-speed connections generally allow users to perform certain activities more efficiently, and may even be a prerequisite for certain online applications requiring high bandwidth, such as streaming television and video.

3.1 Modeling scope of use

So far this section has explored the association between scope of use with age and other user characteristics such as online experience and connection type. However, user experience and connection type are also associated with the socio-demographic characteristics of users. A multivariate model was constructed to assess the association between specific characteristics and scope of Internet use, while holding other factors constant (see Box 5).

10. For an analysis of Internet use, including scope of use, by labour force characteristics, see McKeown, Veenhof and Corman (2008).

Box 5

Analyzing scope measures using a multiple linear regression model

A multiple linear regression model was used to evaluate the strength of association between the independent variables and the number of online activities users performed, controlling for other characteristics in the model.

Using this approach, relationships between user characteristics (namely age, sex, educational attainment, household income, labour force status, urban-rural location, online experience, and connection type) and the number of activities users performed could be more closely studied.

The dependent variable of interest, scope of Internet use, is a count of the number of activities home Internet users performed online in a 12-month period (see Box 4). The values of the dependent variable are continuous, ranging from 0 to a maximum of 26, and are normally-distributed. Independent variables were either continuous (in the case of age and household income), or coded as dichotomous for the purposes of this analysis (Table 3). Due to its skewed distribution, the continuous household income variable was transformed logarithmically, producing a normal distribution for this variable.

Results of the linear regression model (Table 3) reinforce the previous bivariate findings, in that the associations between the variables already discussed and scope of Internet use remain statistically significant when controlling for other factors in the model.[11] For example, age displayed a negative relationship, with scope of use declining as age increases. The coefficient for the continuous age variable (-0.102) suggests that someone who is 10 years older than another user does on average about one fewer activity online, while controlling for other factors in the model. Scope of use increased among experienced users and those with high-speed connections, while controlling for other factors. For example, the coefficient for years of Internet experience (3.379) suggests that users who have been online for 5 or more years carry out approximately 3 more activities than those with less experience.

11. The only exception was labour force status. Although bivariate results indicated that scope of use was higher among persons in the labour force, this was the only variable in the model without a statistically significant association with scope of Internet use, once controlling for other factors.

Table 3
Linear regression results for scope of use, home Internet users[1] aged 18 and older, Canada, 2007

User characteristic	Coefficient (B)
Age [2]	
(Per 1 year increase in age)	-0.102 **
Sex	
Male†	
Female	-1.053 **
Education	
High school (or less)†	
Some post-secondary	1.379 **
Household income [2,3]	
(Per 1 unit increase in log (base 10) of household income)	0.948 **
Years Internet experience	
Less than 5 years†	
5 years or more	3.379 **
Connection type	
Low speed†	
High speed	1.972 **
Labour force status	
In the labour force†	
Out of the labour force	0.265
Location [4]	
Urban (CMA or CA)†	
Rural (non-CMA or CA)	-0.252 **

† Reference group
** Statistically significant at the 99% confidence level ($p < 0.01$)
1. Includes individuals who used the Internet from home in the 12 months preceding the survey and who had a home Internet connection at the time of the survey.
2. Age and income were entered in the model as continuous control variables, and therefore no reference groups are displayed. The coefficients listed are associated with a 1-unit increase in the value of these variables.
3. Household income was logarithimically transformed (base 10) so that it approximated a normal distribution.
4. 'Urban' is defined as consisting of all Census Metropolitan Areas (CMA) and Census Agglomerations (CA). 'Rural' includes all areas outside of CMAs and CAs.

Source(s): Statistics Canada, Canadian Internet Use Survey, 2007.

Additionally, the number of activities increased with users' educational attainment and household income. Scope was lower among female users in comparison with male users. Being in a rural location had a modest, negative association with the number of activities users performed.

Overall, results of the linear regression model indicate that the number of activities users perform online is related to many factors. All factors in the model, with the exception of labour force status, had a significant association with scope of use.

4 Modeling intensity of home Internet use

The previous section took one approach to measuring Canadians' engagement with the Internet by looking at the number of activities users performed in a multivariate model. The analysis which follows uses a similar multivariate approach to better understand the association between selected socio-demographic characteristics of Internet users and their hours and frequency of Internet usage. This will provide additional perspective on factors associated with Canadians' level of online engagement.

Due to the nature of the variables available from the survey to examine this question, a logistic regression model was developed for the analysis (see Box 6).

Box 6

Logistic regression model used to examine intensity of use

A logistic regression model was developed for the analysis in this section. The logistic regression technique was used since the dependent variable of interest was coded as dichotomous (rather than continuous). The model examines whether a home Internet user was a high-intensity user (defined as going online at least once a day, and for 5 or more hours per week - See Box 2 for more information on this variable). The possible outcomes were dichotomous, in that users were either high-intensity users, or they were not. The model was developed to examine which user characteristics were significantly associated with being a high-intensity user.

Some independent variables in the model were coded differently than in the previous section which modeled scope of use. For example, the age and income variables were coded as categorical, and the resulting odds ratios for each group were compared to a reference group (see Table 4). The coding of these independent variables was designed to assist with interpretation of model results.

In the logistic regression model, odds ratios greater than 1 indicate higher odds of the outcome specified (i.e., being a high-intensity user) relative to the reference group; odds ratios lower than 1 represent reduced odds compared to the designated reference group. For more on logistic regression, see Menard (2002).

4.1 Discussion of model results for intensity of use

The logistic regression model uncovered a number of significant relationships between user characteristics and intensity of Internet use (Table 4). The age pattern was particularly strong, with users aged 18 to 24 having the highest odds of being high-intensity users. These younger users had almost two and a half times the odds of users aged 35 to 44 — the reference group in the model.

Table 4
Odds ratios for being a high intensity Internet user, home Internet users[1] aged 18 and older, Canada, 2007

User characteristic	Odds ratio [2]
Age group	
18 to 24	2.41 **
25 to 34	1.38 **
35 to 44†	1.00
45 to 54	0.80 **
55 to 64	0.82 *
65 and older	0.64 **
Sex	
Male†	1.00
Female	0.67 **
Education	
High school (or less)†	1.00
Some post-secondary	1.17 *
Household income	
1 st household income quintile ($24,000 or less)†	1.00
2 nd household income quintile ($24,001 to $39,999)	0.88
3 rd household income quintile ($40,000 to $59,999)	0.71 **
4 th household income quintile ($60,000 to $94,999)	0.73 **
5 th household income quintile ($95,000 or higher)	0.76 *
Years Internet experience	
Less than 1 year†	1.00
1 to less than 2 years	1.53
2 to less than 5 years	2.67 **
5 years or more	6.47 **
Connection type	
Low speed†	1.00
High speed	2.52 **
Labour force status	
In the labour force†	1.00
Out of the labour force	1.54 **
Location [3]	
Urban (CMA or CA)†	1.00
Rural (non-CMA or CA)	1.06

† Reference group
* Difference from reference group is statistically significant at the 95% confidence level ($p < 0.05$)
** Difference from reference group is statistically significant at the 99% confidence level ($p < 0.01$)
1. Includes individuals who used the Internet from home in the 12 months preceding the survey and who had a home Internet connection at the time of the survey.
2. Odds ratios greater than 1.0 represent increased chances of being a high intensity Internet user relative to the reference group; odds ratios less than 1.0 represent reduced chances relative to the reference group.
3. 'Urban' is defined as consisting of all Census Metropolitan Areas (CMA) and Census Agglomerations (CA). 'Rural' includes all areas outside of CMAs and CAs.

Source(s): Statistics Canada, Canadian Internet Use Survey, 2007.

Other characteristics were also significantly associated with intensive use. For example, having post-secondary education had a modest, positive effect on intensive usage. Home Internet users coming from households in the three highest household income quintiles had lower odds of being intensive users than those in the lowest household income quintile. And persons out of the labour force (including retired persons and students) had higher odds of being intensive users than those in the labour force. While the model results cannot shed any light on the causes underlying such relationships, it can be hypothesized that the results for labour force status and income may be related to the time budget of individual users, among other things. For instance, those in the labour force and coming from higher income households may have less discretionary time to use the Internet (i.e. daily and for at least 5 hours per week), than persons not in the labour force and from lower-income households. This theory would require further study using data sources that include some measure of users' discretionary time.

The intensity model also revealed that women had lower odds of being intensive users than men. The extent to which gender differences exist in Internet comfort levels and skills — including perceived skills — may play a role

and has been studied elsewhere (see for example, Hargittai and Shafer 2006). That said, CIUS data reveal that in 2007, women and men differed little in their levels of online experience, with 72% of male users having been online for 5 years or longer, compared with 71% of female users. But other factors may also contribute to the difference in intensity of usage, including the observation that women tend to be more time-stressed than men, and that the increased time pressure facing Canadian women may influence the amount of time they spend on the Internet at home (Marshall 2006, Underhill and Ladds 2007, Lecavalier and Veenhof 2008).

While urban-rural location has been found to be related to the propensity of individuals to use the Internet (see McKeown, Noce and Czerny 2007), it did not have a significant relationship with intensity of use in the model among home users, while controlling for other factors. In other words, geographic location appears more important with respect to whether one uses the Internet than intensity of use, holding other factors constant.[12] This suggests that differences in intensity of use are better explained by the different socio-economic characteristics of urban and rural users themselves.[13]

The model results also reveal relationships between users' level of Internet experience and speed of connection with intensity of use. The results suggest that experienced users are likely to spend more time online and to use the Internet with regularity.[14] That said, earlier analysis (see in particular, Chart 6) found that patterns of use among the most experienced users changed little over the 2005 to 2007 period, suggesting that experienced users have established usage patterns. High speed connections were also associated with intensive use. However, the direction of these relationships cannot be inferred from the model results. Among high-intensity users with dial-up access, likely barriers to use of high speed connections include availability and cost (Middleton and Ellison 2008).

5 Summary

This study uses a variety of measures (e.g. frequency of use, intensity, engagement) to help understand the Internet use patterns of Canadians. The vast majority of Canadian Internet users had high speed connections in 2007 and just under one-half of those high speed users were also high intensity users. But based on the classifications used in this study, there are still more low intensity users than high intensity users, and more users whose engagement level, as measured by scope and intensity of use, is low, than there are with high engagement levels. Canadians are certainly using the Internet, but there are many interesting nuances in their usage patterns that are worthy of further study.

Programs related to development or use of online services, such as government online, should take into account the various online engagement patterns of Internet users. Assumptions that all Canadians are engaged in online activities, or accessing online materials, are not supported by the analysis presented here, suggesting that alternative service delivery mechanisms remain an important consideration.

The multivariate analysis reveals the complexity in determining the relationships between socio-demographic indicators and Internet use, but it is important to note that there are some strong associations. For instance, age, years of online experience, income and sex may serve as differentiators when considering the propensity of an individual to engage in online activities, or understanding the characteristics of high intensity users.

Collectively, the CIUS results provide a foundation to improve our understanding of the engagement of Canadians with this revolutionary technology. In particular, the data suggest that concerns about the digital divide are still valid (e.g. differences in online activities based on age, sex, income etc.). It is also noted that experienced Internet users do use the Internet in more extensive ways, meaning that it is important to continue to study the nature of Internet users as they gain more experience. Technologies are changing rapidly, and the nature of use (e.g. types of activities done online) will continue to evolve over time.

12. In the model, location was not significantly associated with intensity of use, as measured by frequency and hours of Internet usage. It should be noted that being in a rural location had a modest, negative association with the number of activities Internet users performed, based on results from a separate model (see Table 3).
13. For example, 47% or urban home Internet users and 41% rural home users were high-intensity users in 2007. Based on the CIUS data, Internet users living in urban areas were younger and had significantly higher levels of household income than users living in rural areas.
14. It is noted that this result is based on a cross-sectional comparison of experienced users and less experienced users at one point in time. Panel data would be required to assess how intensity patterns change among individual users over time.

6 References

Atkinson, R. D. and D. D. Castro. 2008. *Digital Quality of Life – Understanding the Personal & Social Benefits of the Information Technology Revolution.* Washington, D.C. The Information Technology and Innovation Foundation.

Canadian Radio-Television and Telecommunications Commission (CRTC). 2009. *Communications Monitoring Report.* Ottawa. Canadian Radio-television and Telecommunications Commission.

Dutta, S. and I. Mia. 2009. *Global Information Technology Report 2008-2009.* Geneva. World Economic Forum and INSEAD.

Eastin, M. and R. LaRose. 2000. "Internet self-efficacy and the psychology of the digital divide." *Journal of Computer-Mediated Communication*, Vol. 6, no. 1.

Hargittai, E. and S. Shafer. 2006. "Differences in actual and perceived online skills: The role of gender." *Social Science Quarterly* Vol. 87, no. 2. p. 432-448.

Industry Canada. 2009. *Broadband Canada: Connecting Rural Canadians. www.ic.gc.ca/broadband* (accessed February 8, 2010).

Lecavalier, C. and B. Veenhof. 2008. *Gender Patterns and Online Participation.* Paper presented at the 2008 Statistics Canada Socio-economic Conference. Ottawa. May 5.

Lie, E. 2003. *Promoting Broadband: The Case of Canada.* Geneva. International Telecommunication Union.

Marshall, K. 2006. "*Converging gender roles*," *Perspectives on Labour and Income.* Statistics Canada, Catalogue no. 75-001-XIE, Vol. 7, no. 7. (accessed February 16, 2010).

McKeown, L. and J. Brocca. 2009. "*Internet shopping in Canada: An examination of data, trends and patterns.*" *Business Special Surveys and Technology Statistics Division Working Papers*, Statistics Canada Catalogue no. 88F0006X, no. 5. Ottawa. (accessed February 12, 2010).

McKeown, L., B. Veenhof and J. Corman. 2008. "*Profiling Internet use among workers in the information and communications technologies sector*" *Innovation Analysis Bulletin.* Statistics Canada Catalogue no. 88-003-XWE, Vol. 10, no. 1. p. 22-25. (accessed February 16, 2010).

McKeown, L., A. Noce and P. Czerny. 2007. "*Factors associated with Internet use: Does rurality matter?*" *Rural and Small Town Canada Analysis Bulletin.* Statistics Canada Catalogue no. 21-006-XWE, Vol. 7, no. 3. p. 1-15. (accessed February 12, 2010).

Menard, S. 2002. "Applied logistic regression analysis," 2nd edition. *Quantitative Applications in the Social Sciences,* no. 106. Thousand Oaks, CA. Sage Publications.

Middleton, C. A. and J. Ellison. 2008. "*Understanding Internet usage among broadband households: A study of Household Internet Use Survey data.*" *Science, Innovation and Electronic Information Division Working Papers*, Statistics Canada Catalogue no. 88F0006X, no. 3. Ottawa. (accessed February 16, 2010).

Middleton, C. A. and J. Leith. 2008. *An Analysis of Canadians' Scope of Internet Usage.* Paper presented at the Statistics Canada Socio-economic Conference, Ottawa. May 5.

Middleton, C. A. and J. Leith. 2007. *Intensity of Internet Use in Canada: Exploring Canadians' Engagement with the Internet.* Paper presented at the Statistics Canada Socio-economic Conference, Ottawa. May 20.

Neogi, P., M. Uhrbach, J. Brocca and B. Veenhof. 2009. *Canadian Broadband Investments and Metrics: Monitoring Policies, Use and Impacts.* Paper presented at the Beyond Broadband Access: Data-Based Information Policy for a New Administration Workshop, Washington, D.C. September 22.

Organisation for Economic Co-operation and Development (OECD). 2009. *Households with Broadband Access, 2004-08. Percentage of All Households.* http://www.oecd.org/dataoecd/20/59/39574039.xls. (accessed October 24, 2009).

Statistics Canada. 2008a. "*Canadian Internet Use Survey.*" *The Daily*. June 12. Statistics Canada Catalogue no. 11-001-X. (accessed June 12, 2008).

Statistics Canada. 2008b. "*E-commerce: Shopping on the Internet.*" *The Daily*. Nov. 17. Statistics Canada Catalogue no. 11-001-X. (accessed November 17, 2008).

Telecommunications Policy Review Panel. 2006. *Telecommunications Policy Review Panel - Final Report 2006.* Ottawa. Industry Canada.

UNCTAD Secretariat. 2007. *Information Economy Report 2007-2008 - Science and Technology for Development: The New Paradigm of ICT.* New York and Geneva. United Nations Conference on Trade and Development.

Underhill, C. and C. Ladds. 2007. "*Connecting with Canadians: Assessing the use of government on-line.*" *Connectedness Series,* Statistics Canada Catalogue No. 56F0004MIE, no. 15. (accessed February 16, 2010).

Veenhof, B. 2006. "*The Internet: Is it changing the way Canadians spend their time?*" *Connectedness Series,* Statistics Canada Catalogue No. 56F0004MIE, no. 13. (accessed February 16, 2010).